



Instruction manual mic+ Ultrasonic Sensors with one analogue output and two switched outputs

mic+25/DDIU/TC
mic+35/DDIU/TC
mic+130/DDIU/TC
mic+340/DDIU/TC
mic+600/DDIU/TC

Product description

- The mic+sensor with one analogue output and two switched outputs measures the distance to an object within the detection zone contactless. A signal proportional to distance is created and the switched outputs are set according to the adjusted detect distances.
- The sensor automatically detects the load put to the analogue output and switches to current output or voltage output respectively.
- All settings are done with two push-buttons and a three-digit LED-display (TouchControl).
- Light emitting diodes (three-colour LEDs) indicate the operation conditions.
- Choosing between rising and falling output characteristic as well as output function NOC and NCC is possible.
- The sensors are adjustable manually using the numerical LED-display or may be trained using Teach-in processes.
- Useful additional functions are set in the Add-on-menu.
- Using the LinkControl adapter LCA-2 (optional accessory) all TouchControl and additional sensor parameter settings may be made by a Windows-Software.

Important instructions for assembly and application

All employee and plant safety-relevant measures must be taken prior to assembly, start-up, or maintenance work (see operation manual for the entire plant and the operator instruction of the plant).

The sensors are not considered as safety equipment and may not be used to ensure human or machine safety!

The mic-sensors indicate a **blind zone**, in which the distance cannot be measured. The **operating range** indicates the distance of the sensor that can be applied with normal reflectors with sufficient function reserve. When using good reflectors, such as a calm water surface, the sensor can also be used up to its **maximum range**. Objects that strongly absorb (e.g. plastic foam) or diffusely reflect sound (e.g. pebble stones) can also reduce the defined operating range.

Assembly distances

The table below lists the minimum mounting distances between two sensors. Smaller distances should not be used because otherwise the sensors can influence each other.

Distance	Distance	Distance
≥0.35 m	≥2.50 m	≥2.50 m
≥0.40 m	≥2.50 m	≥2.50 m
≥1.10 m	≥8.00 m	≥8.00 m
≥2.00 m	≥18.00 m	≥18.00 m
≥4.00 m	≥30.00 m	≥30.00 m

Fig. 1: Minimum assembly distances

Assembly instructions

- Assemble the sensor at the installation location.
- Plug in the connector cable to the M 12 connector.

Pin	Signal	Colour
1	+U _B	brown
3	-U _B	blue
4	D2	black
2	I/U	white
5	D1/Com.	grey

Fig. 2: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

Start-up

mic+ sensors are delivered factory made with the following settings:

- Rising analogue characteristic
- Window margins for the analogue output set to blind zone and operating range
- Switched outputs on NOC
- Detecting distances at operating range and half operating range
- Measurement range set to maximumrange

Set the parameters of the sensor manually or use the Teach-in procedure to adjust the detect points.

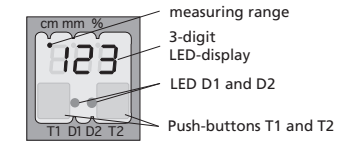


Fig. 3: TouchControl

Operation

mic+sensors work maintenance free. Small amounts of dirt on the surface do not influence function. Thick layers of dirt and caked-on dirt affect sensor function and therefore must be removed.

Note

- mic+sensors have internal temperature compensation. Because the sensors heat up on their own, the temperature compensation reaches its optimum working point after approx. 30 minutes of operation.
- If the LCA-2 is connected to the mic+ when turning supply voltage on, the sensors start in communication mode and the switched output on pin 5 of the connector is not available.
- The load put to the analogue output is detected automatically when turning supply voltage on.
- During normal mode operation, a yellow LED signals that the corresponding switched output has connected.
- During normal mode operation, the measured distance value is displayed on the LED-indicator in mm (up to 999 mm) or cm (from 100 cm). Scale switches automatically and is indicated by a point on top of the digits. Alternatively a percentage scale may be set in the add-on menu. In this connection 0% and 100% correspond to the set window margins of the analogue output.
- During Teach-in mode, the hysteresis loops are set back to factory settings.
- In the »Two-way reflective barrier« operating mode, the object has to be within the range of 0-85 % of the set distance.
- If no objects are placed within the detection zone the LED-indicator shows »- -«.
- If no push-buttons are pressed for 20 seconds during parameter setting mode the made changes are stored and the sensor returns to normal mode operation.

Show parameters

Tapping push-button T1 shortly during normal mode operation shows »PAR« on the LED-display. Each time you tap push-button T1 the actual settings of the analogue output and the switched output are shown.

Contact

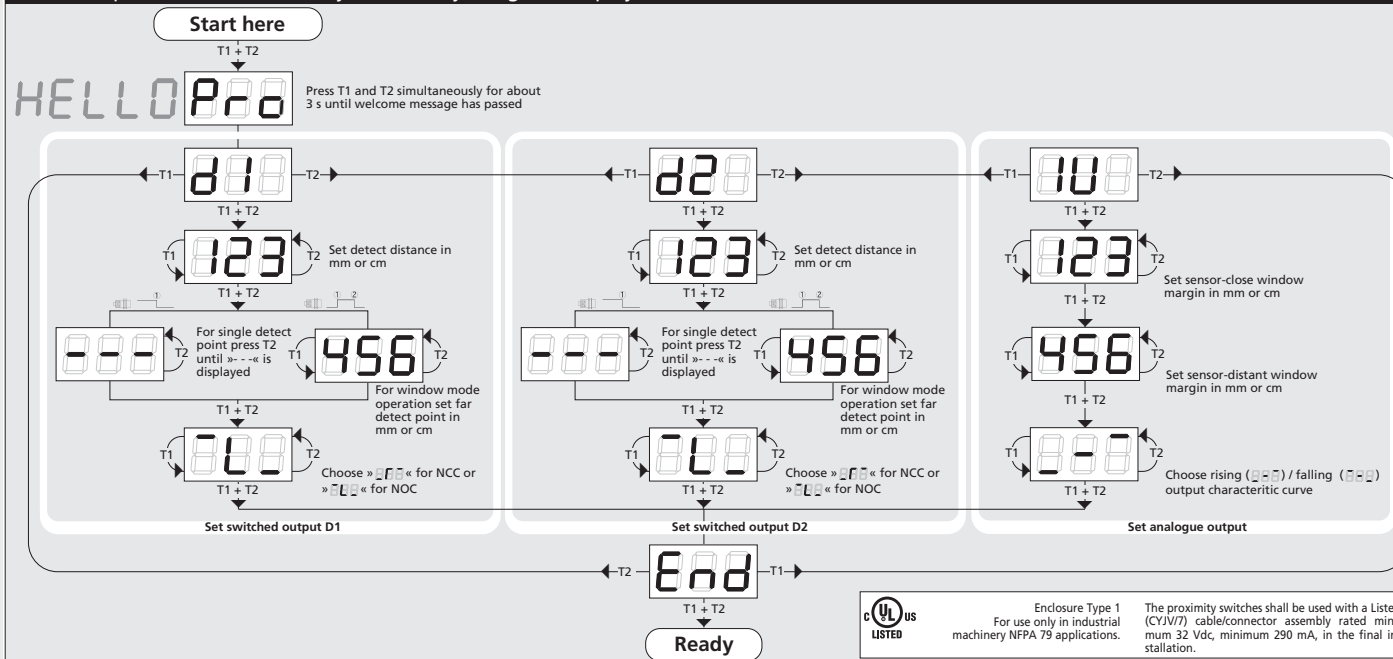
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Set sensor parameters alternatively numerically using LED-display...



...or with the Teach-in procedure

Teach-in switched output D1

Adjust detect point D1
Place object at position ①
Press T1 until »d« is shown
123 Current measuring value
Press T1 until »End« is shown

Adjust window mode D1
Place object at position ①
Press T1 until »d1« is shown
123 Current measuring value
Place object at position ②
456 Current measuring value
Press T1 until »End« is shown

Adjust two-way reflectiv barrier D1
Place object at position ①
Press T1 until »d1« is shown
123 Current measuring value
Press T1 until countdown passed from »-8« to »-0« and »End« is displayed

Set NOC/NCC D1
Press T1 until countdown passed from »-8« to »-0« and NOC or NCC symbol is displayed
000 Symbol NOC or NCC
To change output function press T1
000 Symbol NOC or NCC
Press T1 and T2 simultaneously until »End« is displayed

Normal mode operation

Teach-in analogue output D2

Adjust detect point D2
Place object at position ①
Press T2 until »d2« is shown
123 Current measuring value
Press T2 until »End« is shown

Adjust window mode D2
Place object at position ①
Press T2 until »d2« is shown
123 Current measuring value
Place object at position ②
456 Current measuring value
Press T2 until »End« is shown

Adjust two-way reflectiv barrier D2
Place object at position ①
Press T2 until »d2« is shown
123 Current measuring value
Press T2 until countdown passed from »-8« to »-0« and »End« is displayed

Set NOC/NCC D2
Press T2 until countdown passed from »-8« to »-0« and NOC or NCC symbol is displayed
000 Symbol NOC or NCC
To change output function press T2
000 Symbol NOC or NCC
Press T1 and T2 simultaneously until »End« is displayed

Normal mode operation

Key lock and factory setting

Activate/deactivate TouchControl
Turn supply voltage OFF
While pressing T1 turn supply voltage ON until »on« or »off« is displayed
000 »on« or »off«
To activate or deactivate press T1
OFF »on« or »off«
To activate or deactivate press T1

Reset to factory setting
Turn supply voltage OFF
Turn supply voltage ON while pressing T1 and keep it pressed for ca. 15 s until »E5E« has passed through the display

Normal mode operation

Usefull additional functions in Add-on menu (for experienced users only, settings not required for standard applications)

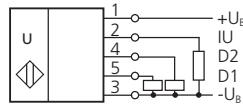
Start here
HELLO Pro Add-on Press T1 and T2 simultaneously for about 13 s until »Add« is shown in the LED-display

Ready

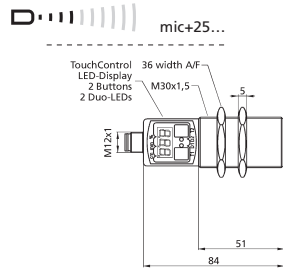
<p>»C01«: Display bright »C02«: Display dimmed »C03«: Display off</p> <p>Low power mode</p>	<p>»- -«: Display in mm or .cm »□□«: Display in %, 100% at minimum measured value »□□«: Display in %, 100% at maximum measured value</p> <p>Display mode</p>	<p>»Aut«: automatic detection of the load »U«: voltage output »I«: current output</p> <p>Choose current/voltage output</p>	<p>Minimum value: »001« Maximum value: difference between maximum range and detect point - 1 During window mode operation hysteresis influences both detect points.</p> <p>Hysteresis switched output D1</p>	<p>Minimum value: »001« Maximum value: difference between maximum range and detect point - 1 During window mode operation hysteresis influences both detect points.</p> <p>Hysteresis switched output D2</p>	<p>»F00«: no filter »F01«: standard filter »F02«: averaging filter »F03«: foreground filter »F04«: background filter</p> <p>Measurement filter</p>	<p>Defines the strength of the chosen filter. »P00«: weak filter up to »P09«: strong filter</p> <p>Filter strength</p>	<p>Delay in seconds between the detection of an object and the output of the measured distance in case of object approach (behaves as on-delay). *00*: 0 s (no delay) up to *20*: 20 s response time</p> <p>Response time</p>	<p>Minimum value: blind zone Maximum value: nearwindow limit - 1</p> <p>Foreground suppression</p>	<p>No function</p>	<p>No function</p>	<p>Minimum value: sensor-distant window margin Maximum value: 999 mm for mic+25/...,mic+35/..., 999 cm for mic+130/...,mic+340/..., mic+600/...</p> <p>Measurement range</p>	<p>Put plane reflector vertically disposed in front of sensor: in an exact distance of 25... and mic+35... and 900 mm for all other types. Adjust display to 250 mm or 900 mm. Confirm calibration with T1 + T2.</p> <p>Calibration display</p>	<p>Affects the size of the detection zone. »E01«: high »E02«: standard »E03«: slight</p> <p>Detection zone sensitivity</p>
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Note
Changes in the Add-on menu may impair the sensor function.
A6, A7, A8, A10, A11, A12 have influence on the response time of the sensor.

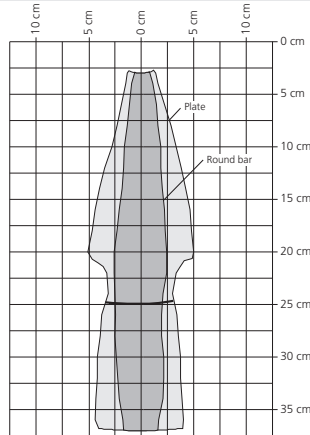
Technical data



2 pnp switched outputs + analogue output

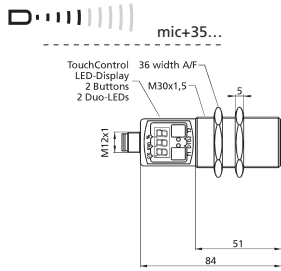


0 to 30 mm
 250 mm
 350 mm
 Please see detection zone
 320 kHz
 0,025 mm bis 0,10 mm, depending on the analogue window

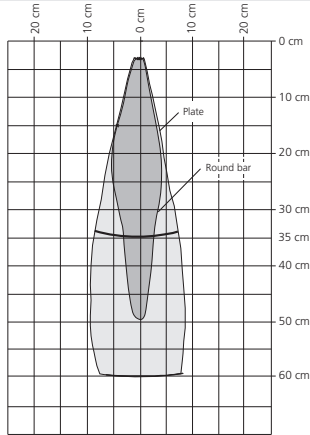


operating voltage U_B 9 V to 30 V DC, short-circuit-proof, Class 2
reproducibility $\pm 0,15\%$
accuracy $\pm 1\%$ (Temperature drift internal compensated, may be deactivated¹⁾, 0,17%/K without compensation)
Voltage ripple $\pm 10\%$
No-load supply current ≤ 80 mA
Housing Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content
Class of protection to EN 60529 IP 67
Norm conformity EN 60947-5-2
Type of connection 5-pin initiator plug, PBT
Controls 2 push-buttons (TouchControl)
Indicators 3-digit LED-display, 2 three-colour LEDs
Programmable Yes, with TouchControl and LinkControl
Operating temperature -25°C to +70°C
Storage temperature -40°C to +85°C
Weight 150 g
Switching hysteresis¹⁾ 3mm
switching frequency¹⁾ 11 Hz
Response time¹⁾ 50 ms
Time delay before availability < 300 ms

Order No. mic+25/DDIU/TC
Switched output 2 x pnp, $U_B - 2$ V, $I_{max} = 2 \times 200$ mA
 switchable NOC/NCC, short-circuit-proof
Current output 4 – 20 mA $R_L \leq 100 \Omega$ at 9 V $\leq U_B \leq 20$ V;
 $R_L \leq 500 \Omega$ at $U_B \geq 20$ V
 Rising/falling output characteristic
Voltage output 0 – 10 V $R_L \geq 100$ k Ω at $U_B \geq 15$ V, short-circuit-proof
 Rising/falling output characteristic

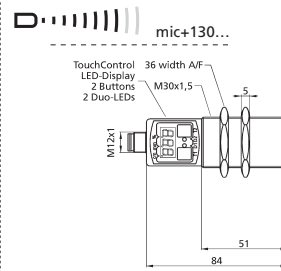


0 to 65 mm
 350 mm
 600 mm
 Please see detection zone
 400 kHz
 0,025 mm bis 0,17 mm, depending on the analogue window

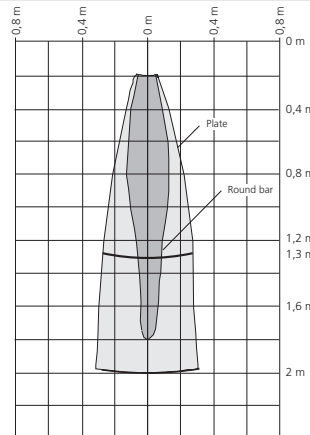


9 V to 30 V DC, short-circuit-proof, Class 2
reproducibility $\pm 0,15\%$
accuracy $\pm 1\%$ (Temperature drift internal compensated, may be deactivated¹⁾, 0,17%/K without compensation)
Voltage ripple $\pm 10\%$
No-load supply current ≤ 80 mA
Housing Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content
Class of protection to EN 60529 IP 67
Norm conformity EN 60947-5-2
Type of connection 5-pin initiator plug, PBT
Controls 2 push-buttons (TouchControl)
Indicators 3-digit LED-display, 2 three-colour LEDs
Programmable Yes, with TouchControl and LinkControl
Operating temperature -25°C to +70°C
Storage temperature -40°C to +85°C
Weight 150 g
Switching hysteresis¹⁾ 5 mm
switching frequency¹⁾ 8 Hz
Response time¹⁾ 70 ms
Time delay before availability < 300 ms

Order No. mic+35/DDIU/TC
Switched output 2 x pnp, $U_B - 2$ V, $I_{max} = 2 \times 200$ mA
 switchable NOC/NCC, short-circuit-proof
Current output 4 – 20 mA $R_L \leq 100 \Omega$ at 9 V $\leq U_B \leq 20$ V;
 $R_L \leq 500 \Omega$ at $U_B \geq 20$ V
 Rising/falling output characteristic
Voltage output 0 – 10 V $R_L \geq 100$ k Ω at $U_B \geq 15$ V, short-circuit-proof
 Rising/falling output characteristic

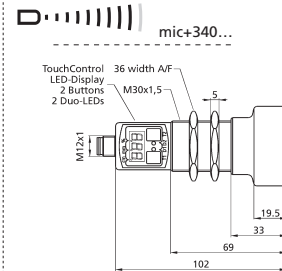


0 to 200 mm
 1.300 mm
 2.000 mm
 Please see detection zone
 320 kHz
 0,18 mm bis 0,57 mm, depending on the analogue window

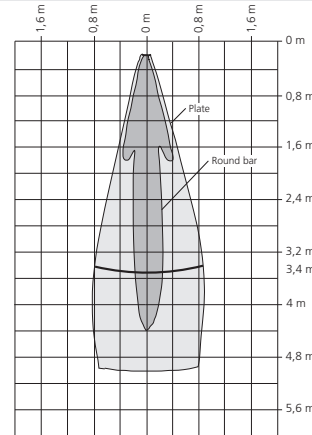


9 V to 30 V DC, short-circuit-proof, Class 2
reproducibility $\pm 0,15\%$
accuracy $\pm 1\%$ (Temperature drift internal compensated, may be deactivated¹⁾, 0,17%/K without compensation)
Voltage ripple $\pm 10\%$
No-load supply current ≤ 80 mA
Housing Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content
Class of protection to EN 60529 IP 67
Norm conformity EN 60947-5-2
Type of connection 5-pin initiator plug, PBT
Controls 2 push-buttons (TouchControl)
Indicators 3-digit LED-display, 2 three-colour LEDs
Programmable Yes, with TouchControl and LinkControl
Operating temperature -25°C to +70°C
Storage temperature -40°C to +85°C
Weight 150 g
Switching hysteresis¹⁾ 20 mm
switching frequency¹⁾ 6 Hz
Response time¹⁾ 110 ms
Time delay before availability < 300 ms

Order No. mic+130/DDIU/TC
Switched output 2 x pnp, $U_B - 2$ V, $I_{max} = 2 \times 200$ mA
 switchable NOC/NCC, short-circuit-proof
Current output 4 – 20 mA $R_L \leq 100 \Omega$ at 9 V $\leq U_B \leq 20$ V;
 $R_L \leq 500 \Omega$ at $U_B \geq 20$ V
 Rising/falling output characteristic
Voltage output 0 – 10 V $R_L \geq 100$ k Ω at $U_B \geq 15$ V, short-circuit-proof
 Rising/falling output characteristic

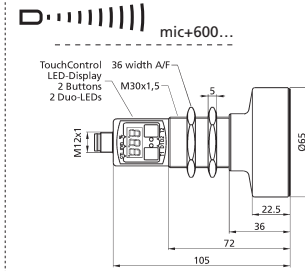


0 to 350 mm
 3.400 mm
 5.000 mm
 Please see detection zone
 120 kHz
 0,18 mm bis 1,50 mm, depending on the analogue window

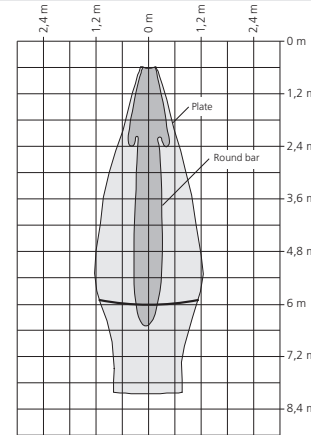


9 V to 30 V DC, short-circuit-proof, Class 2
reproducibility $\pm 0,15\%$
accuracy $\pm 1\%$ (Temperature drift internal compensated, may be deactivated¹⁾, 0,17%/K without compensation)
Voltage ripple $\pm 10\%$
No-load supply current ≤ 80 mA
Housing Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content
Class of protection to EN 60529 IP 67
Norm conformity EN 60947-5-2
Type of connection 5-pin initiator plug, PBT
Controls 2 push-buttons (TouchControl)
Indicators 3-digit LED-display, 2 three-colour LEDs
Programmable Yes, with TouchControl and LinkControl
Operating temperature -25°C to +70°C
Storage temperature -40°C to +85°C
Weight 210 g
Switching hysteresis¹⁾ 50 mm
switching frequency¹⁾ 3 Hz
Response time¹⁾ 180 ms
Time delay before availability < 300 ms

Order No. mic+340/DDIU/TC
Switched output 2 x pnp, $U_B - 2$ V, $I_{max} = 2 \times 200$ mA
 switchable NOC/NCC, short-circuit-proof
Current output 4 – 20 mA $R_L \leq 100 \Omega$ at 9 V $\leq U_B \leq 20$ V;
 $R_L \leq 500 \Omega$ at $U_B \geq 20$ V
 Rising/falling output characteristic
Voltage output 0 – 10 V $R_L \geq 100$ k Ω at $U_B \geq 15$ V, short-circuit-proof
 Rising/falling output characteristic



0 to 600 mm
 6.000 mm
 8.000 mm
 Please see detection zone
 80 kHz
 0,18 mm bis 2,40 mm, depending on the analogue window



9 V to 30 V DC, short-circuit-proof, Class 2
reproducibility $\pm 0,15\%$
accuracy $\pm 1\%$ (Temperature drift internal compensated, may be deactivated¹⁾, 0,17%/K without compensation)
Voltage ripple $\pm 10\%$
No-load supply current ≤ 80 mA
Housing Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content
Class of protection to EN 60529 IP 67
Norm conformity EN 60947-5-2
Type of connection 5-pin initiator plug, PBT
Controls 2 push-buttons (TouchControl)
Indicators 3-digit LED-display, 2 three-colour LEDs
Programmable Yes, with TouchControl and LinkControl
Operating temperature -25°C to +70°C
Storage temperature -40°C to +85°C
Weight 270 g
Switching hysteresis¹⁾ 100 mm
switching frequency¹⁾ 2 Hz
Response time¹⁾ 240 ms
Time delay before availability < 300 ms

Order No. mic+600/DDIU/TC
Switched output 2 x pnp, $U_B - 2$ V, $I_{max} = 2 \times 200$ mA
 switchable NOC/NCC, short-circuit-proof
Current output 4 – 20 mA $R_L \leq 100 \Omega$ at 9 V $\leq U_B \leq 20$ V;
 $R_L \leq 500 \Omega$ at $U_B \geq 20$ V
 Rising/falling output characteristic
Voltage output 0 – 10 V $R_L \geq 100$ k Ω at $U_B \geq 15$ V, short-circuit-proof
 Rising/falling output characteristic

¹⁾ Can be programmed with TouchControl and LinkControl